COMPARISON OF THE EFFECTIVENESS OF ORAL PREDNISOLONE AND DEXAMETHASONE ADMINISTERED PRE OPERATIVELY, IN REDUCING POST SURGICAL SEQUELAE FOLLOWING IMPACTED THIRD MOLAR REMOVAL – A RANDOMIZED CLINICAL TRIAL

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CERTIFICATE

This is to certify that the dissertation titled "**COMPARISON OF THE EFFECTIVENESS OF ORAL PREDNISOLONE AND DEXAMETHASONE ADMINISTERED PRE OPERATIVELY, IN REDUCING POST SURGICAL SEQUELAE FOLLOWING IMPACTED THIRD MOLAR REMOVAL – A RANDOMIZED CLINICAL TRIAL.**" is a bonafide record of work done by **Dr. VIJAY R.** Under my guidance during his postgraduate study period between **2009 – 2012.**

This dissertation is submitted to **THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY,** in partial fulfilment for the degree of **MASTER OF DENTAL SURGERY** in **Branch III – Oral and Maxillofacial Surgery.**

It has not been submitted (partially or fully) for the award of any other degree or diploma.

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CONTENTS

Introduction

INTRODUCTION

Surgical extraction of the impacted third molar is considered as one of the routine procedures in Oral and Maxillofacial surgery. In spite of meticulously planned and executed surgical procedures, patients complain of pain, swelling and limitation in mouth opening which makes it even more frustrating and annoying for both the patient and the surgeon.

The factors contributing to post-operative pain, edema and trismus is complex but many of the contributing factors are related to the inflammatory process. Aseptic sterile surgical techniques will minimize the sequelae of inflammation but will not prevent them. Hence, the use of pharmacotherapy will help in controlling the extent of the inflammatory process so that post-operative sequelae may be reduced in intensity or severity.

Various studies have been done with the use of wide range of drugs like antihistamines[31,49], NSAIDS[5,12,21,40], steroids[8,13,17,23,26,38], enzymes[38,48], serratiopeptidase[2,10,48] and antibiotics[32,43,47]. Drain modified surgical techniques[19], gloving techniques[9], ice compression techniques[20, 51], laser therapy[6, 34] and even hyaluronidase[46] have been reported to reduce the post operative sequelae of third molar surgery.

Increased knowledge of mechanism of pain and understanding of the role of inflammation and its mediators resulted in effective use of new means of controlling post operative pain.

Oral surgeons have been using corticosteroids to minimize these sequelae and have obtained satisfactory results[8,13,23,26,37]. Corticosteroids are successful in controlling acute inflammation by interfering with the multiple signalling pathways involved in the inflammatory response. Their biological action is not completely understood, but the primary mechanisms are thought to involve suppression of leukocyte and macrophage accumulation at the site of inflammation and prevention of prostaglandin formation through the disruption of the arachidonic acid cascade[15, 33].

Dexamethasone[13, 25, 34]& prednisolone[8, 18] has been extensively used in oral surgery due to its high potency and long half life. Several different routes and times of administration (e.g., oral[6, 29], intravenous[15, 17, 18] and intramuscular[16]; preoperative[15, 16, 17] and perioperative[25]) have been recently advocated because of limited benefits when the therapy was applied postoperatively. Corticosteroid therapy may not be necessary in all wisdom tooth removals, but may be indicated only in cases of some technical difficulty. Clinicians would therefore benefit from knowing whether it is clinically relevant during surgery to use an effective steroid therapy. Patients would also not incur the risk of pharmacological over-treatment or side effects.

Despite the frequent clinical use of dexamethasone & prednisolone, the pre operative oral administration in controlling post surgical complications remains poorly investigated.

The aim and objective of this randomized clinical trial is to compare the effectiveness of oral pre-operative administration of prednisolone and dexamethasone in preventing post operative sequelae after surgical removal of impacted lower third molar under local anaesthesia.

Review of Literature

REVIEW OF LITERATURE

Keesling and Hinds 1957[31] Evaluated the use of antihistamines in oral surgery using a double blind technique, 116 patients with third molar impactions were being involved in this trial. The results showed that the antihistamines were not effective in reducing post operative pain and edema and they did not improve healing. Indeed, if anything, the placebo seemed to be more effective.

Shuttee T.S 1962[46] Reported on the effect of hyaluronidase in the relief of post operative trismus, swelling and pain. He studied patients with bilateral mandibular third molar impactions and patients with unilateral impactions. Following the administration of a local anesthetic, a separate injection of either hyaluronidase or saline was given in the muccobccal fold opposite the third molar region. In each case of bilateral impaction, one side of the jaw was injected with hyaluronidase and the other with saline. The patients served as their own control. The author concluded that from the analysis of results, the rate of recovery from trismus for bilateral impactions was significantly better when hyaluronidase was used. Overall, it was suggested that hyaluronidase was beneficial in reducing post operative trismus, swelling and pain.

Sinclair J.H 1969[48] Looked at the use of streptokinase-streptodornase (varidase) in the management of traumatic face injuries. It is probable that

streptokinase breaks down protein barriers by activation of fibrinolytic systems in the body. It is thus possible that such substances bring about the rapid dissolution of fibrinous exudates. The author concluded that when varidase was given to patients with gross facial edema resulting from traumatic injuries, there was a more rapid dissolution of the edema than in those patients who had not received the enzymes.

James. R. Hooley et al 1974[29] Have shown that the use of steroid results in prevention of swelling associated with major oral surgical procedures and in reduction of patient's hospitalization time. Corticosteroids temporarily depress adrenal function; however, normal function returns in 2 or 3 days after cessation of therapy. They also advocated the oral use of betamethasone for reduction of swelling, trismus and pain after the difficult removal of mandibular third molars.

Eugene. J. Messer et al 1975[35] Suggested the use of intraoral dexamethasone to reduce pain, trismus and post operative edema after third molar surgery. Their clinical findings in over 5,000 patients have shown that transoral injection of dexamethasone at the time of surgery appears to be effective in the prevention of post operative edema.

H.S. Breytenbach 1978[7] Suggested in his study conducted over 600 samples that most accurate objective method for measuring edema to date is the stereo photogrammetric method, because of its 3-dimensional measuring

ability. Authors also recommended that lateral expansion of the cheek with a specially devised apparatus can be used in addition for measurements.

Raymond A. Dionne et al 1978[14] Evaluated the use of pre operative administration of ibuprofen for the post operative pain after the surgical removal of impacted third molars. Patients who received ibuprofen pre operatively showed a delay in the mean time of onset of post operative pain of more than 100 minutes as compared to pre treatment placebo.

Lewis W. Williamson et al 1980[52] Have shown that the amount of surgical stress involved in routine oral surgical procedures is of an in sufficient magnitude to overcome the hypothalamic-pituitary-adrenal suppression of the negative feedback mechanism caused by dexamethasone therapy. The presence of adequate amounts of synthetic steroids at a cellular level appears to prevent manifestations of adrenal insufficiency despite suppression of endogenous production of steroids.

Sal L. Bahn1982[4] Concluded that persistent adrenal suppression generally occurs only when glucocorticoid supplementation exceeds physiologic levels for periods greater than 4-5 days when adrenal atrophy first becomes measurable. Short-term high-dose therapy does not cause significant adrenal problems. Alternate day therapy, early morning dosing, single doses, or very short term regimens sharply reduce adrenal suppression and may allow routine dental car without any supplementation. All glucocorticoid side effects may be minimized using these regimens. Elective glucocorticoids used for

their anti-inflammatory effect are seldom warranted unless the benefits of such therapy far outweigh the risks and complication attendant to their se. for optimal anti-inflammatory effect pre-operative doses must be given early enough to allow adequate tissue level at the time of wounding or stress.

Mohamed M. Amin et al 1983[3] Evaluated the effectiveness of indomethacin in suppressing the post operative inflammatory edema, pain and trismus after surgical removal of impacted third molar. They concluded that indomethacin can be used prophylactically to reduce pain, edema and trismus which equal to that of acetaminophen and codeine with minor side effects.

M.Elhag et al 1985[16] Conducted a single blind, controlled trial to assess the anti-inflammatory effects of 10mg dexamethasone given pre and post operatively and also ultrasound therapy in patients following the removal of impacted Mandibular third molars. Facial swelling and trismus were significantly reduced in both dexamethasone and ultrasound treated groups compared with an untreated control group. This first report of anti inflammatory properties of ultrasound in a controlled clinical trial indicates its potential clinical se in reducing post operative morbidity in oral surgery.

Allen L. Sisk et al 1985[19] Evaluated and compared the efficacy of corticosteroids, NSAIDS and placebo for reduction of acute post operative inflammatory response and its sequel in patients undergoing the surgical removal of impacted third molars. Corticosteroids appear to have maximal effect in controlling edema but had minimal analgesic effects. Non-steroidal

anti-inflammatory agents are effective analgesics. They concluded that a single class of drugs is not maximally effective in controlling both post operative pain and post operative swelling.

C.S. Holland et al 1987[28] Compared the influence of methyl prednisolone with that of a placebo on post operative pain, swelling and on healing. 20 patients undergoing removal of symmetrically placed bilateral lower third molars under local analgesia by the same operator were evaluated. One side at a time was used. In each individual patient, for one side 40 mg Methylprednisolone was given intravenously immediately pre operatively and for the other side a placebo was given on a double-blind random basis. The results showed that the mean post operative swelling at 24 hours was reduced by 56% when methyl Prednisolone was used compared with the opposite side of the same patient when the placebo was used. The severity of pain also was reduced over the first day but healing was similar for each side. They concluded that single I.V. dose of 40 mg of Methylprednisolone pre operatively is effective in reducing post operative swelling following third molar surgery.

Emanuel S. Trollos et al 1990[17] Compared the results of NSAIDs ibuprofen and flurbiprofen with Methylprednisolone and placebo for acute pain, swelling and trismus following third molar surgery. They found that NSAIDs produced greater initial analgesia than did steroids, whereas steroids resulted in greater suppression of swelling and less loss of function.

Michael T. Montgomery et al 1990[39] Evaluated the use of glucocorticoids in dentistry to control post surgical inflammation. Glucocorticoid acceptance has been impaired by concerns over side effects, adrenal suppression and efficacy. The pattern of administration generally used is characterized as short term, high-dose or pulse therapy, which has not been associated with significant side effects or adrenal suppression beyond 10 days. The selection of an appropriate glucocorticoid with minimal mineralocorticoid activity and extended biological activity is desirable. Oral and parenteral dosing is possible. The efficacy of glucocorticoids in reducing pain, swelling and trismus after third molar surgery is difficult to ascertain because of methodological inconsistencies between investigations. High- dosing intravenous studies has demonstrated significant short- term improvements, but the effects were not sustained. Combining administration with multiple oral dosing or a single intramuscular dose may be required to extend short-term improvement. High-dosing I.M. studies have shown significant and sustained anti inflammatory effects with a single dose administered either pre or post operatively.

Lisa Gersema et al 1992[33] Reviewed the clinical trials involving the use of corticosteroids in oral surgery on the following points: 1) the type of procedure; 2) the specific regimen and its relative potency; and 3) the methods used to determine results. The potential for complications induced by peri-operative corticosteroid se, such as adrenal suppression and delayed wound

healing were also discussed. Initial trials subjectively demonstrated that corticosteroids reduced the amount of inflammation associated with oral surgery especially edema. Subsequent objective evaluation of corticosteroid use has shown consistent reductions in edema. Corticosteroid doses ranged from 80 to 625 mg hydrocortisone equivalent anti- inflammatory dosage. No significant adverse reactions were noted. The use of peri-operative corticosteroids appears to be a safe and rational method of reducing post operative complications following the removal of impacted third molars.

LCDR Edward A. et al 1992[15] Conducted a study on 60 patients with bilaterally symmetrical impacted third molars to quantify the effects of 4mg of dexamethasone on reducing post surgical sequelae. Each patient's surgery was staged by mouth side and completed in 2 appointments 5 to 6 weeks apart. A pre operative dose of dexamethasone given intravenously was randomized to mouth side and surgical appointments; sterile water served as a control. Facial swelling, pain and trismus were assessed. No difference in swelling and daily pain was noted. However, trismus and global pain were significantly affected by the steroid. Patients had a daily post surgical increase in incisal opening of 4 to 6mm over the control side. During the examination period no increase in the rate or type of complication was detected between control and steroid sides.

T. Hyrkas et al 1993[30] Evaluated the efficacy of 40mg of Methylprednisolone given intravenously before operation in combination with orally administered rapid release and sustained release diclofenac preparations in preventing post operative pain after third molar removal. They concluded that the administration of Methylprednisolone and diclofenac resulted in greater pain relief than did administration of diclofenac alone.

Cemil Borkvall.P et al 1993[6] Evaluated the effect of soft laser application on post operative pain and swelling in 25 adults with bilateral impaction using soft laser and placebo laser. They concluded that there was no beneficial effect on swelling, trismus and pain after third molar surgery.

LTC Ronald et al 1993[37] Determined the effects of two dosage regimens of dexamethasone on the serum cortisol levels of a group of patients undergoing major maxillofacial surgical procedure. They demonstrated that the use of dexamethasone 10 to 20 mg intravenously given every 3 hours intra operatively and every 4hours post operatively over 24 hours followed by a repository dose of 80 mg of intramuscular Methylprednisolone cases short term serum cortisol suppression. The maximum depression occurred on post operative day 3; normal levels were restored by post operative day 7. Therefore, pulsed therapy can be considered relatively safe when known contraindications have been considered.

B.M.W. Bailey et al 1993[5] Compared the analgesic efficacy and patient acceptability of soluble aspirin and diclofenac dispersible in patients with post operative pain after removal of impacted third molars. A total of 136 patients were randomly allocated to receive soluble aspirin 600mg t.d.s or diclofenac dispersible 50mg t.d.s after extraction under local anesthesia of impacted third molars on one side of the mouth. The medication, which was both patient and operator blind, was reversed after extraction of the contra lateral third molars three weeks later, the patients acting as their own controls in assessing post operative pain, pain relief and inter-incisal opening. Patients receiving diclofenac dispersible recorded significantly lower pain levels; pain relief was significantly greater and the patient's assessment significantly favoured diclofenac dispersible.

S. Schultze Mosgauet al 1995[40] Evaluated a combination treatment of ibuprofen and Methylprednisolone for pain and swelling. The efficacy of 32mg Methylprednisolone on pain and swelling when given 12 hours before and after surgery in combination with 400mg ibuprofen three times a day given immediately on the day of the operation and on the two subsequent days following removal of impacted third molars was investigated in a placebo, controlled, intraindividual double blind study. After use of ibuprofen/ Methylprednisolone, ultra sonic examination showed a reduction in swelling of 56% ($p<0.001$) compared with the placebo group; measurements with a tape measure showed a 58% ($p<0.001$) reduction in swelling. The visual

analog scale showed a reduction of 67.7% in post operative pain in comparison with placebo. They concluded that the combination of ibuprofen and Methylprednisolone has a good analgesic and anti inflammatory action.

Abel Garcia et al 1997[1] Studied a consecutive series of 104 patients, all of whom underwent removal of an impacted lower third molar under local surgery. Difficulty of surgery was evaluated on a modified version of the Parent scale: I, extraction with forceps only; II, extraction by ostectomy; Ill, extraction by ostectomy and coronal section; IV, complex procedures. Trismus was evaluated in terms of maximum interincisal distance (MID) 1 and 5 days after surgery. Pain was evaluated on the basis of reported analgesic use 1 and 5 days after surgery. Finally they concluded that Trismus is less severe after simple (forceps-only, grade I) extractions than after surgical extractions (grades II to IV). However, trismus severity after surgical extraction does not depend on difficulty of surgery. Pain, as revealed by reported analgesic use, is likewise less severe after simple extractions. Regardless of extraction type, pain declines between days 1 and 5 post surgery.

Emin Esen et al 1999[18] Evaluated the anti inflammatory effect and adrenal suppressive side effects of Methylprednisolone sodium succinate (MP) on the post operative sequelae of third molar surgery using objective methods in a double blind, cross over study. 20 patients who were to undergo surgical removal of bilateral symmetrically placed lower third molars were studied. Each patient was given 125mg MP intravenously before surgery on one side

and a placebo before surgery on the opposite side on a random basis. Ultrasonography and computed tomographic examinations were performed to determine the amount of facial edema. Trismus was evaluated by measuring maximal inter incisal opening and pain was evaluated by recording the number of standard analgesic tablets used on the day of surgery and first post operative day. Hypothalamic-pituitary-adrenal (HPA) axis function was tested by measuring basal plasma cortisol levels pre operatively and post operatively. The adrenocorticotropic hormone (ACTH) stimulation test also was performed before and after administration of MP to evaluate adrenal function.

Statistical analysis of the data indicated a significant decrease in edema, trismus and pain in the MP group. Plasma cortisol levels showed a non significant decrease in both the MP and placebo treated groups. The ACTH stimulation test indicated normal HPA axis function before and after MP administration. No clinically apparent infection, disturbance of wound healing, or other corticosteroid related complications were noted. They concluded that in the absence of contraindications for corticosteroid administration, pre operative se of Methylprednisolone appears to be a safe and effective method of reducing post operative complications in third molar surgery.

Garibaldi J. A et al 2002[21] Analyzed the combination of oral ketorolac 10 mg with varying amounts of codeine phosphate, and the postoperative pain relief that developed from these combinations. Five groups of patients were administered the codeine/ketorolac combinations. Variations

of the combinations were analyzed to ascertain if an optimal analgesic ratio existed. All controllable variables involved with the surgical procedure were held constant to allow for better evaluation of postoperative pain. Results obtained from 67 patients indicated that the best pain relief was achieved with a combination of 10 mg ketorolac and 15 mg codeine phosphate. Codeine alone provided adequate analgesia, but the addition of ketorolac reduced the patients' perceived side effects. The presence of codeine in the analgesic combination was also shown to reduce the number of days that the patient required the medication postoperatively. Reducing the duration of medication use postoperatively may also minimize the possible side effects of ketorolac and codeine, which could develop with extended periods of use.

Raymond. A. Dionne et al 2003[13] Evaluated the in vitro relationship between levels of prostanoid at the site of tissue injury and analgesia after dexamethasone administration in a clinical model of tissue injury. Subjects were administered dexamethasone 4mg or placebo 12hours and 1 hour before the removal of 2 mandibular third molars. A microdialysis probe was implanted at each surgical site for measurement of immunoreactive prostaglandin E_2 (PGE_2) or immunoreactive thromboxane B_2 (TXB_2) and pain was measured concurrently. Subjects received either ketorolac 30mg intravenously or placebo at pain onset. They concluded that the lack of an analgesic effect foe dexamethasone while reducing both PGE_2 and TXB_2 at the site of injury in comparison to ketorolac analgesia accompanied by greater

reductions in levels of these prostanoid suggests that glucocorticoids at this dose do not suppress PGE_2 release sufficiently to attenuate peripheral sensitization of nociceptors after tissue injury.

Ong K.S et al 2004[41] Evaluated the efficacy of pre-emptive ketorolac in a crossover design in patients undergoing bilateral mandibular third molar surgery. This was a double blind, randomized, placebo-controlled study where 34 patients had each of their identical impacted mandibular third molars removed under local anesthesia on two occasions. Each patient acted as their own control; one side was pretreated with intravenous ketorolac 30 mg before surgery followed by placebo injection after surgery, and for the other side, the patient was given placebo injection before surgery and post-treated with intravenous ketorolac 30 mg after surgery. The difference in postoperative pain between pretreated and post-treated side in each patient was assessed by four primary end-points: pain intensity as measured by a 100-mm visual analogue scale hourly for 12 h, time to rescue analgesic, postoperative analgesic consumption, and patient's global assessment. Throughout the 12-h investigation period, patients reported significantly lower pain intensity scores in the ketorolac pre-treated sides when compared with the post-treated sides. Patients also reported a significantly longer time to rescue analgesic (8.9 h versus 6.9 h, P ¼ 0:005), lesser postoperative analgesic consumption (P ¼ 0:007) and better global assessment for the ketorolac pre-treated sides (P ¼ 0:01). Pre-treatment with intravenous ketorolac has a pre-emptive effect for

postoperative third molar surgery and extended the analgesia by approximately 2 h.

Van Der Westhuijzen et al 2005[51] Compared the efficacy of Tecnol bilateral facial ice packs with no cold therapy in reducing pain, swelling and trismus during the first 24 h following third molar surgery. Sixty patients requiring general anaesthesia for removal of bilateral, impacted third molar teeth were included and randomly assigned to one of two treatment groups. One group received Tecnol1 bilateral facial ice packs following surgery, while a control group received no form of cold therapy. Facial ice packs were applied in the recovery room within 15 min of the end surgery and patients were asked to use the ice packs continuously for the next 24 h. Surgical and anaesthetic techniques as well as pharmacological regimens were standardized. Postoperative pain levels were compared hourly, for 4 h, then on the evening of surgery and the following morning. Facial swelling and trismus were compared preoperatively and 24 h postoperatively. No statistically significant difference was found between the two treatment groups with respect to pain, facial swelling or trismus.

Buyukkurt et al 2006[8] Studied forty-five patients who were to undergo surgical removal of lower third molars. Patients were divided into 3 groups. In the first group, each patient was given 25 mg prednisolone intramuscularly immediately after surgery. In the second group, each patient was given 25 mg prednisolone and diclofenac intramuscularly immediately

after surgery, and in the third group, each patient was given sterile saline solution as control group. Postoperative pain was evaluated by visual analogue scale on the day of surgery. Facial swelling and trismus were evaluated on postoperative days 2 and 7. It was determined that the combination of a single dose of prednisolone and diclofenac is well-suited to the treatment of postoperative pain, trismus, and swelling after dental surgical procedures and should be used when extensive postoperative swelling of soft tissue is anticipated.

Chiu et al 2006[9] Conducted a study in which a total of 275 ASA I, non-smoking and non-drinking patients consented to be randomly assigned into two groups for lower wisdom tooth surgery, performed by operators wearing either sterile or clean gloves. All the patients returned for a postoperative assessment visit one week later. An additional 40 patients were recruited and randomised into the sterile glove group (n = 20) or the clean glove group (n = 20) for the microbiology study. Specimens were taken from the glove surfaces and the post-operative socket wounds during wisdom tooth surgery. This clinical trial showed no significant difference between the sterile and clean glove groups in the incidence of acute inflammation, acute infection and dry sockets in the wounds. No single peri-operative factor had a statistically significant effect on post-operative pain intensity. Most of the bacterial isolates from the clean gloves were Gram-positive cocci or spore-forming bacilli. The total number of colony forming units and the variety of

bacterial isolates from the socket wounds in the sterile and clean glove groups were similar. The study concluded that there was no advantage in using sterile surgical gloves rather than clean gloves to minimize post-operative complications in wisdom tooth surgery. There was also no apparent relationship between the bacteria contaminating the clean glove surfaces and those isolated from the socket wounds.

Graziani et al 2006[25] Evaluated the effect of endo-alveolar and sub-mucosal administration of dexamethasone sodium phosphate to prevent inflammatory sequelae after surgical removal of lower third molars. Forty-three patients underwent bilateral extractions of lower third molars and were randomly assigned to receive either dexamethasone 4 mg (group A) or 10 mg (group B) as endo-alveolar powder or 10 mg as sub-mucosal injection (group C) unilaterally. The contralateral site served as control and did not receive any steroid administration. Facial edema, trismus and pain perception were evaluated at the 2nd and 7th postoperative day. A multivariate analysis revealed that treatment and ostectomy time were both significantly positively associated with the degree of postoperative trismus and edema. Other baseline classification variables (e.g., molar classification) were also predictive of the degree of change in all clinical parameters. Test sites treated (any steroid application) showed greater reductions in all clinical parameters recorded compared to control. No statistically significant differences were observed between the three test groups. Both sub-mucosal and endo-alveolar

administration of dexamethasone is effective in reducing postoperative sequelae of surgical removal of lower wisdom teeth.

Giovanni Battista Grossi et al 2007[23] In this study Sixty-one consecutive patients requiring surgical removal of a single mandibular impacted third molar under local anesthesia were randomly placed into 3 groups. After the onset of local anesthesia, the experimental groups received dexamethasone at 2 different doses (4 or 8 mg) as submucosal injection, and the control group received no drug. Standardized surgical and analgesic protocols were followed. Maximum interincisal distance and facial contours were measured at baseline and at post surgery days 2 and 7. Pain was objectively measured by counting the number of analgesic tablets required. Mouth opening, taken as the maximum distance between upper and lower central incisors, was measured by ruler (to the nearest mm). Facial swelling was evaluated by a modification of tape measurement. Two measurements were made between 3 reference points: tragus, pogonion, and the corner of the mouth. The preoperative sum of the 2 measurements was considered as the baseline for that side. The patients' perception of the severity of symptoms was assessed with a follow-up questionnaire (PoSSe scale). Their results showed on the second postoperative day, facial edema showed a statistically significant reduction in both dexamethasone 4-mg and dexamethasone 8-mg groups compared with the control group, but no statistically significant differences were observed between the 2 dosage regimens of dexamethasone.

By contrast, there was no statistically significant difference between all groups when postoperative swelling was evaluated at day 7. The treatment group had a limited and non significant effect on pain and trismus when compared with the control group at the 2 times of evaluation. Finally the author concluded parenteral use of dexamethasone 4 mg, given as an intraoral injection at the time of surgery, is effective in the prevention of postoperative edema. Increasing the dose to 8 mg provides no further benefit.

Gupta et al 2007[26] Studied the effect of submucosal administration of dexamethasone to prevent the inflammatory sequelae. Hundred patients were studied who underwent surgical removal of bilateral third molars in two appointments on OPD basis. One site received injection dexamethasone and other site received injection saline. Both operators as well as the patient were blinded for the study. Post-operative pain, swelling and trismus were recorded on first, fourth and seventh post operative days. Pain by visual analogue scale, trismus by inter-incisal length before and after surgery; and swelling measuring from angle of the mouth to outer canthus of the eye and corner of the mouth to the attachment of ear lobe; were evaluated. The site which received injection dexamethasone showed considerable decrease in post-operative sequelae as compared to control site.

Markovic & Todorovic 2007[34] The author included 120 healthy patients divided into four groups of 30 each. Group 1 received LPL irradiation immediately after operation (energy output 4 J/cm2 with constant power

density of 50 mW, wavelength 637 nm); group 2 also received i.m. injection of 4 mg dexamethasone (Dexason1) into the internal pterygoid muscle; group 3 received LPL irradiation supplemented by systemic dexamethasone (Dexason1), 4 mg i.m. in the deltoid region, followed by 4 mg of dexamethasone intraorally 6 h postoperatively; and the fourth (control) group received only the usual postoperative recommendations (cold packs, soft diet, etc.). Their results showed that LPL irradiation with local use of dexamethasone (group 2) resulted in a statistically significant reduction of postoperative oedema in comparison to the other groups. No adverse effects of the procedure or medication were observed. Finally they concluded that LPL irradiation after lower third molar surgery can be recommended to minimize swelling. The effect is enhanced by simultaneous local intramuscular use of dexamethasone.

Al-Khateeb et al 2008[2] Evaluated Twenty-four healthy individuals with symmetrically impacted mandibular third molars underwent surgical removal in a prospective, intra-individual, and randomized, double-blind, and cross-over study. Teeth were removed in 2 sessions by the same surgeon. At each session, one third molar was removed under local anaesthesia via a buccal osteotomy. All patients received a combination of either serrapeptase 5 mg or placebo tablets and 1000 mg paracetamol tablets at either the 1st or 2nd operation in accordance with the randomization plan. Cheek thickness, pain and interincisal distance were measured preoperatively, and on the 1st, 2nd,

3rd and 7th postoperative days. Cheek thickness and maximum interincisal distance were measured using callipers. Pain intensity was assessed clinically using a numeric scale. There was a significant reduction in the extent of cheek swelling and pain intensity in the serrapeptase group at the 2nd, 3rd and 7th postoperative days, but no significant difference in mean maximal interincisal distance was found between the 2 groups.

Felix et al 2008[19] Conducted a prospective randomized study to evaluate the effect of using a rubber drain on postoperative pain, swelling and trismus after lower third molar surgery. Of 100 patients with impacted lower third molars referred for surgical extraction, there were 40 males and 60 females, aged 18–40 years (mean = 26 _ 6.2SD). The patients were randomly divided into two equal groups. In the experimental group, a Penrose rubber drain was inserted into the extraction socket near the buccal fold after surgery and left for 72 h. The control group was selected using the same criteria and treated under the same surgical protocol as the experimental group, but without use of a rubber drain. Pain, swelling and trismus were evaluated at 24 h, 72 h and 5 days postoperatively in both groups. Pain was evaluated using visual analog scale. Trismus was evaluated by measuring the maximal interincisal distance. Evaluation of facial swelling was performed using a horizontal and vertical guide with a tape on four reference points: tragus, outer corner of the mouth, outer canthus of the eye and angle of the mandible. The results of the study indicate that the use of a rubber drain reduces

postoperative discomfort in the form of swelling and trismus after lower third molar surgery, but seems to have no effect on pain.

Forouzanfar et al 2008[20] The study was designed to investigate the effect of compression with ice and compression alone on pain and quality of life after surgical removal of mandibular third molars. A prospective, single-blind, randomized controlled study design was chosen. Participants in group A applied 45 min of repeated compression with ice; those in group B applied 45 min of repeated compression without ice (control); and those in group C did not apply any compression. Pain intensity was measured on a visual analogue scale (VAS) three times a day for seven days. At day seven, overall pain reduction was scored on a global perceived effect (GPE) scale and a quality-of-life questionnaire was completed. Ninety-five patients completed the trial. The VAS scores demonstrated a significant pain decrease in groups A and B three days postoperatively. No significant differences were observed between groups A and B. Based on the GPE ratings, in groups A and B more patients indicated that pain was reduced successfully, but this was not statistically significant. Quality of life was significantly better for patients in groups A and B. These results demonstrate that compression after surgical removal of mandibular third molars is a valuable method for preventing pain.

Michael R et al 2008[37] A systematic search of the literature was carried out to identify eligible articles. The primary predictor variable was perioperative CS exposure (yes or no). The 3 outcome variables were edema,

trismus, and pain assessed during the early (1-3 days) and late (3 days) postoperative time periods. Standardized mean differences (SMD) for edema and weighted mean differences (WMD) for trismus and pain were pooled across studies. Differences between the 2 treatment groups were assessed using random effects models and metaregressions for both early and late postoperative assessments. The findings of this study suggest that perioperative administration of corticosteroids produces a mild to moderate reduction in edema and improvement in range of motion after M3 removal.

Zaid et al 2008[53] The author conducted a prospective cohort study of a sample of subjects having at least 1 mandibular M3 surgically extracted at a teaching hospital in Jordan. The predictor variables were categorized as patient, anatomic, and operative specific. The outcome variables were postoperative complications recorded as present or absent. Bivariate analyses were computed, and then a multivariate logistic regression model was used to identify independent predictors for the common postoperative complications. The study sample was comprised of 149 patients who had 245 extractions. The mean age was21.6 - 3.32 years; 64.9% were females. In the multivariate logistic regression model, age, M3 side in relation to the handedness of the operator, and lingual retraction were the variables found as independent predictors for alveolar osteitis. The level of impaction had a significant association with trismus, and operation time acted as an independent predictor for pain.

The author finally concluded that postoperative morbidity increases with older age, deeper impaction, M3 side differing from the handedness of the operator, and longer procedures.

Chopra.D et al 2009[10] The study included 150 patients with impacted lower third molars. They were randomly sorted to receive ibuprofen, paracetamol, betamethasone, serratiopeptidase or placebo. Evaluation of efficacy was made using tape measurement (for swelling), visual analogue scale (for pain evaluation), mouth opening ability and oral temperature. The effect of treatment on hematological parameters, bleeding, wound healing and requirement for rescue medication was also studied. Peak pain scores were observed approximately 5– 6 hours after the operation. Betamethasone showed significant analgesic activity from day 1. Ibuprofen and betamethasone were significantly more effective than placebo in reducing swelling. Trismus was least with betamethasone. A significant rise in temperature on the operated side occurred only on day 1 in all the groups.

Serratiopeptidase did not showed significant analgesic and anti-inflammatory action. Mild-to-moderate adverse effects were reported.

De Menezes S.A.F et al 2010[12] In this study twenty patients with two impacted inferior third molars, in similar positions, was selected. The patients were designated randomly to the meloxicam group (MEL: 7.5 mg twice a day for 5 days) or the nimesulide group (NIM: 100 mg for 5 days). Pain, swelling, trismus were evaluated in each group. Trismus was measured using will's

calliper. Distances used for the evaluation of postoperative swelling: from the angle of the mandible to tragus (Distance I); from the angle of the mandible to the external corner of the eye (Distance II); from the angle of the mandible to the nasal border (Distance III); from the angle of the mandible to the labial commisure (Distance IV); and from the angle of the mandible to the soft pogonion (Distance V). The sensation of pain was evaluated in the periods 8–12 h, 12–24 h and after 24 h postoperatively using a verbal rating scale. Following the extractions, swelling was more pronounced in the MEL group than in the NIM group (P _ 0.001). There were no significant differences in pain intensity between the treatment groups ($P > 0.05$). At the 72-h evaluation, reduction was significantly larger in mouth opening in the MEL group compared with the NIM group ($P < 0.05$). In conclusion, pain control was similar in both treatment groups. NIM was more effective than MEL in the control of swelling and trismus following the extraction of impacted lower third molars.

Sandhu et al 2010[45] The study was conducted to compare the effects of flap design on the postoperative sequelae of pain, swelling, trismus and wound dehiscence after surgical removal of bilateral impacted mandibular third molars (M3). 20 patients aged 20–30 years who required removal of bilateral impacted M3 were included in the study. Maximum interincisal opening and facial measurements were recorded preoperatively. Bayonet flap was used on one side and envelope flap on the other side for the removal of

impacted M3. The effect of flap design on pain, swelling, trismus and wound dehiscence was evaluated postoperatively. Pain and wound dehiscence were significantly greater in the envelope flap group compared with the bayonet flap group. No significant difference in postoperative swelling and trismus was found in either group. Finally they concluded that bayonet flap was superior to the envelope flap for postoperative pain and wound dehiscence. There was no difference in postoperative swelling and trismus between the two groups.

Siddiq et al 2010[47] The author conducted a prospective, randomized, double blind, placebo-controlled clinical trial. 100 patients were randomly assigned to two groups. Each patient acted as their own control using the split-mouth technique. Two unilateral impacted third molars were removed under antibiotic cover and the other two were removed without antibiotic cover. The first group received antibiotics on the first surgical visit. On the second surgical visit (after 3 weeks), placebo capsules were given or vice versa. The second group received antibiotics with continued therapy for 2 days on the first surgical visit and on the second surgical visit (after 3 weeks) placebo capsules were given or vice versa. Pain, swelling, infection, trismus and temperature were recorded on days 3, 7 and 14 after surgery. Of 380 impactions, 6 sockets (2%) became infected. There was no statistically significant difference in the infection rate, pain, swelling, trismus, and temperature between the two groups. Results of the study showed that

prophylactic antibiotics did not have a statistically significant effect on postoperative infections in third molar surgery and should not be routinely administered when third molars are removed in non-immunocompromised patients.

Materials and Methods

MATERIALS AND METHODS

This study was conducted on 90 patients selected among the outpatients attending the Department of Oral & Maxillofacial Surgery, Sri Ramakrishna Dental College and Hospital, Coimbatore, with an indication of extraction of impacted third molar. The selected patients were explained about the study and informed consent was obtained.

INCLUSION CRITERIA

1. Patients who did not have any signs and symptoms of pain, trismus and swelling at the time of mandibular third molar surgery.
2. Patients especially whom in some amount of bone removal is necessary for extraction of impacted third molar.
3. Patient has to be periodontally healthy and not showing any signs of acute pericoronitis at the time of surgery.
4. Third molar has to be class A or B and position 1 and 2 according to Pell and Gregory radiographical classification.

EXCLUSION CRITERIA

The following patients were excluded from the study:

1. Clinically significant medical history (e.g. systemic infective disease, heart and vascular disease, liver disease, haematological disease, deficiency of coagulation, neoplastic disease).
2. Patients with suspected or proven gastric ulcer.
3. Pregnant and lactating females.
4. Patients who were already on some anti-inflammatory drugs.
5. Patients who were known to be allergic to steroids.
6. Patients having pre-existing infection.
7. Patients whose mental level or lack of cooperation may make the interpretation of results difficult or impossible.
8. Patients unwilling to undergo the data collection procedures.

PRE-OPERATIVE EVALUATION

All the selected cases did not have any signs and symptoms of pain, trismus and swelling at the time of surgical removal of impacted mandibular third molar. Past episodes of these symptoms were recorded in case history.

A case history proforma which comprises the details of clinical evaluation was designed to have a methodical recording of the observations and investigations carried out.

The following shows the proforma used in our department for impacted mandibular third molar evaluation -

SRI RAMAKRISHNA DENTAL COLLEGE & HOSPITAL.

DEPARTMENT OF ORAL & MAXILLOFACIAL SURGERY

PROFORMA FOR EVALUATION

S.No: Date:

Patient Name:

Age/Sex:

Address:

Operator:

PRE OPERATIVE ASSESSMENTS

Patient's Complaint:

Medical History:

PRE OPERATIVE PAIN SCORE:

MOUTH OPENING:

(Inter Incisal Distance)

HORIZONTAL DISTANCE:

(Distance from corner of the mouth to lobe of the ear)

VERTICAL DISTANCE:

(Distance from outer canthus of the eye to the angle of mandible)

RADIOGRAPH ASSESSMENT

TYPE:

CLASS:

POSITION:

With /without steroid -

INTRA OPERATIVE ASSESSMENTS

Duration of surgical procedure:

Amount of bone removal:

Tooth sectioning done/not done:

Wound closure:

POST OPERATIVE FINDINGS

	After the day of surgery	
	2^{ND} POD	7^{TH} POD
MOUTH OPENING Inter Incisal Distance ID		
FACIAL SWELLING Horizontal Distance HD Vertical Distance VD		
PAIN INTENSITY 0 - No Pain 2-4 – Mild Pain 5-7 – Moderate Pain 8-10 – Severe Pain		

SURGICAL PROCEDURE

The surgical procedure on the selected patients was carried out at the department of oral and maxillofacial surgery, Sri Ramakrishna Dental College and Hospital, Coimbatore on an outpatient basis under local anaesthesia.

In this study 90 patients were randomly divided into 3 groups (A, B & C). Each group consists of 30 patients.

After case history and general physical examination, the impacted mandibular third molar was assessed clinically and radiographically.

In **Group A**, 10mg of prednisolone tablet 20minutes before surgery was given.

In **Group B**, 8mg of dexamethasone tablet 20minutes before surgery was given.

In **Group C**, no preoperative steroids were given. (Control group)

The instruments used for the surgical removal of impacted lower third molar are shown in the figure no.8

After 20 minutes, under aseptic precautions, 2% lignocaine (with adrenaline 1:80000) was injected to block the inferior alveolar nerve, lingual nerve and long buccal nerve. The standard mandibular third molar incision was used (A triangular full thickness flap with releasing incision on the mesio-buccal aspect of the second Molar) and adequate bone removal was done with

rotary cutting instruments. Odontomy or odontectomy procedures were employed depending upon the path of removal of the impacted teeth. The tooth was removed with the help of elevators and forceps. After thorough wound debridement, the flap was approximated and sutured with 3-0 black braided silk suture. A pressure pack was given. All patients were instructed to follow a cold semi liquid diet for the first day and then to continue the regular diet from the next day. Patients were informed not to spit, gargle, smoke, and consume alcohol or to keep ice pack. They were instructed to remove the pressure pack after 1 hour. Post operatively all patients were prescribed a regular medication of amoxicillin 500mg, metronidazole 400mg and paracetamol 650mg orally three times daily for 3 days. The patients were recalled for review on 2^{nd} and 7^{th}post operative day and suture removal was done on 7^{th}post operative day. Patients were allowed to take additional paracetamol[10] 1000mg if pain persists. The duration for the operation was recorded. The duration of operation was from the time of incision to the time of socket closure.

The following para meters were used for preoperative and post operative evaluation of the patient.

1. **PAIN[10,17,25]:** patients recorded pain using a visual analog scale (V.A.S), during the second and seventh days after operation.

The visual analog scale is characterized as 10mm in length where 0 was marked as no pain and 10 as most severe pain. The scale was

further subdivided into four intervals (0 = no pain, 2-4 = mild, 5-7 = moderate, 8-10 = severe pain).

2. **SWELLING[3,8,15]:** The external facial measurements were made by marking the following points. Measurements were done with the help of a white thread and meter scale.

a. Horizontal distance between the corner of the mouth and lobule of the ear - HD

b. Vertical distance between the outer canthus of the eye and the angle of the mandible – VD

3. **MOUTH OPENING[8,15,17]:** The distance between the incisal edges of the maxillary and mandibular central incisors was measured with the help of divider and scale with the mouth opened to its fullest. The magnitude of mouth opening was measured pre-operatively and on the 2nd and 7thpost operative day.

Figures

METHODOLOGY OF PRE/POST OPERATIVE EVALUATION

Figure 1: Showing Pre Operative Frontal View

Figure 2: Showing Pre Operative Profile View

METHODOLOGY OF PRE/POST OPERATIVE EVALUATION OF CHEEK SWELLING

Figure 3: Showing the Horizontal Measurement from Corner of the Mouth to Lobule of the Ear

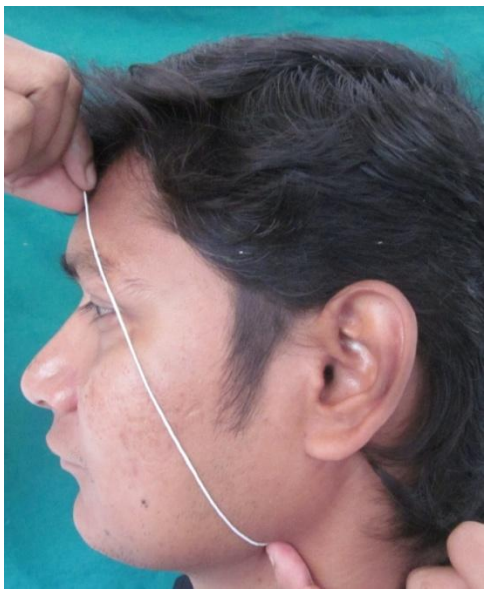


Figure 4: Showing the Vertical Measurement from Outer Canthus of Eye to Angle of the Lower Jaw

METHODOLOGY OF PRE/POST OPERATIVE EVALUATION OF MOUTH OPENING

Figure 5: Showing Pre Operative Mouth Opening

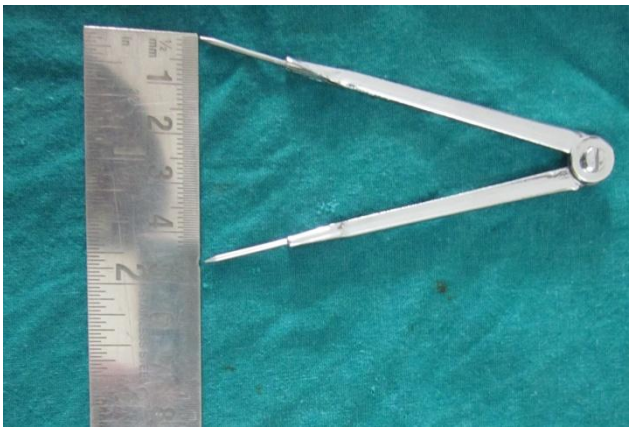


Figure 6: Transfering the Divider Measurement into millemeter

ARMAMENTARIUM USED FOR THE STUDY

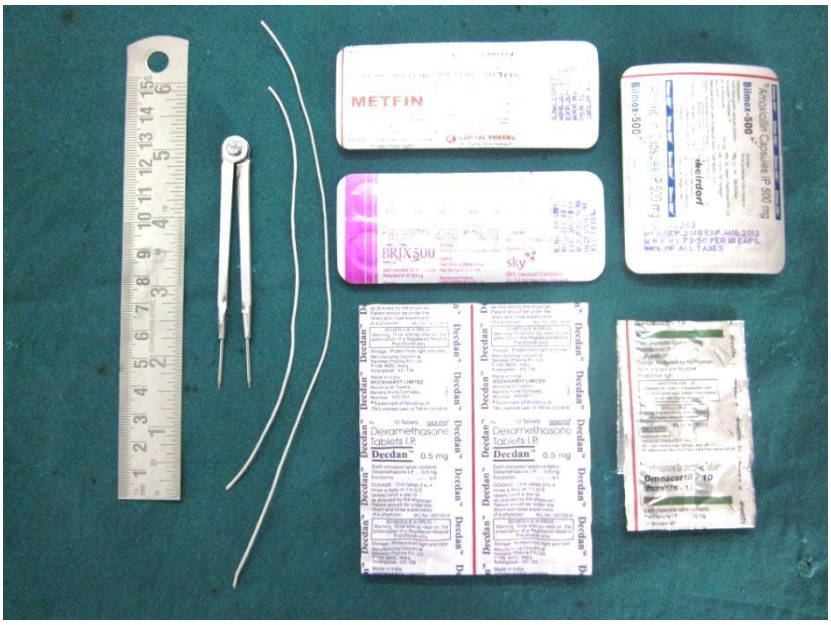


Figure 7: Showing Materials used for the study

Figure 8: Showing Instruments used for surgical removal of Impacted 3rd molar

Results

RESULTS

The study was conducted on 90 patients selected among the patients attending the Department of Oral and Maxillofacial Surgery, Sri Ramakrishna Dental College and Hospital, Coimbatore. The patients were selected to compare the effectiveness of oral pre-operative administration of prednisolone and dexamethasone in preventing post operative sequelae in patients undergoing surgical removal of impacted lower third molar under local anaesthesia.

In this study 90 patients were randomly divided into 3 groups. (30 patients each)

Group A patients received 10mg prednisolone tablet 20mins before the surgery (male17, female13, mean age 28.73yrs)

Group B patients received 8mg dexamethasone tablet 20mins before the surgery (male13, female17, mean age 29.96yrs)

Group C patients did not receive any steroids (male12, female18, mean age 33.16yrs). (Control group). Only below mentioned regular medications were given post operatively.

Number of male and female patients in each group is depicted in table 1, and graph no.1 shows graphical representation of the same.

The patients in all the 3 groups received amoxicillin 500mg and metronidazole 400mg and paracetamol 650mg 6^{th} hour postoperatively for 3 days. No reported complications or therapy side effects were observed in any of the extractions performed.

The following parameters were checked pre operatively and on the 2^{nd} and 7^{th}post operative days – Pain, Swelling and Mouth opening. ANOVA was used to analyze the data and POST HOC TAMAHANE'S T2 TEST was used for inter group comparisons.

Table 1 - Shows Number of Male & Female Patients in each Group

SEX	ANTIBIOTIC	DEXAMETHASONE	PREDNISOLONE
MALE	12	13	17
FEMALE	18	17	13

Graph 1- Shows Graphical Representation of Number of Male/Female Patients in each Group

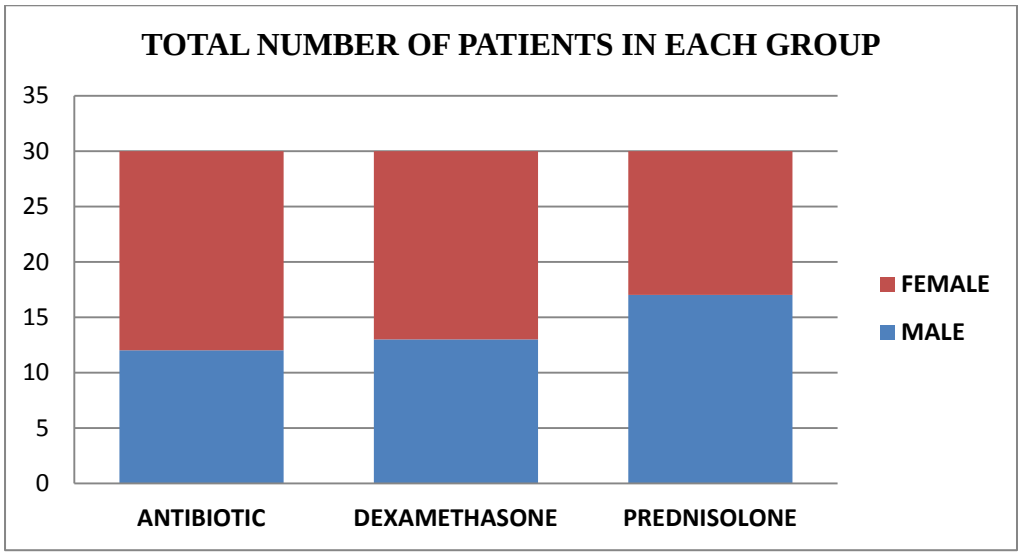


Table 2 - Comparison of Mean Reduction in Mouth Opening (Percentage) Between Three Groups during Different Time Intervals

S. No	Parameter	Antibiotic Group	Dexamethasone Group	Prednisolone Group	P Value (Anova Test)	Inference
1.	Mean reduction in mouth opening after 48 hours (percentage)	19.53%	6.63%	3.38%	$p < 0.001$	Highly significant
2.	Mean reduction in mouth opening after 1 week (percentage)	10.22%	1.72%	0.74%	$p < 0.001$	Highly significant

Table 2: Shows at different time intervals the mean reduction in mouth opening is expressed as percentage values, following surgical removal of 3rd molar. The difference between these means percentage reductions was found to be statistically significant. ($p<0.001$) using analysis of variance (ANNOVA) test.

Table 3 - Inter Group Comparison of Percentage Reduction in Mouth Opening Measures using Anova Post Hoc Tamahane's T2 Test

Intergroup comparisons	Actual mean difference (in mm)	Mean difference (in percentage)	P value	Inference
AFTER 48 HOURS				
Antibiotic group vs. dexamethasone group	-8.27	12.90%	P < 0.0001	Highly significant
Antibiotic group vs. prednisolone group	-7.83	16.15%	P < 0.0001	Highly significant
Dexamethasone group vs. Prednisolone group	0.43	3.25%	P = 0.013	Significant
AFTER 1 WEEK				
Antibiotic group vs. dexamethasone group	-6.40	8.50%	P < 0.0001	Highly significant
Antibiotic group vs. prednisolone group	-4.73	9.48%	P < 0.0001	Highly significant
Dexamethasone group vs. Prednisolone group	1.67	0.98%	P = 0.248	Not significant

Table 3: Inter group comparisons using POST HOC TAMAHANE'S T2 TEST showed that maximal reduction in mouth opening was observed in the antibiotic group and least reduction was observed in the prednisolone group. The statistical difference in mean percentage between the antibiotic group and the other two groups was highly significant, ($p<0.001$) both after 2^{nd} and 7^{th}post operative day. The difference between dexamethasone and prednisolone group was significant after 2^{nd} post op day (p-0.013) while it was insignificant after 7^{th} post op day (p-0.200). Thus the prednisolone group showed the least reduction in mouth opening followed by dexamethasone & antibiotic group respectively.

Table 4 - Comparison of Mean Increase in Vertical Dimension of Face (Percentage) between Three Groups during Different Time Intervals

S. No	Parameter	Antibiotic Group	Dexamethasone Group	Prednisolone Group	P value (Anova Test)	Inference
1.	Mean increase in horizontal dimension of face after 48 hours (percentage)	6.52%	3.73%	1.80%	P < 0.001	Highly significant
2.	Mean increase in horizontal dimension of face after 1week (percentage)	3.77%	1.04%	0.23%	P < 0.001	Highly significant

Table 4: represents the mean percentage increase in vertical dimensions observed at 2nd and 7thpost operative day, following removal of the impacted third molar. The difference observed between the three groups was highly significant ($p<0.001$) both after 2nd and 7thpost operative day.

Table 5 - Comparison of Mean Increase in Horizontal Dimension of Face (Percentage) Between Three Groups during Different Time Intervals

S. No	Parameter	Antibiotic Group	Dexamethasone Group	Prednisolone Group	P Value (Anova Test)	Inference
1.	Mean Increase In Horizontal Dimension Of Face After 48 Hours (Percentage)	6.52%	3.73%	1.80%	P < 0.001	Highly Significant
2.	Mean Increase In Horizontal Dimension Of Face After 1 Week (Percentage)	3.77%	1.04%	0.23%	P < 0.001	Highly Significant

Table 5: represents the mean percentage increase in horizontal dimensions observed at 2nd and 7thpost operative day, following removal of the impacted third molar. The difference observed between the three groups was highly significant ($p<0.001$) both after 2nd and 7thpost operative day.

Table 6 - Inter Group Comparison of Percentage Increase in Vertical Dimension using Anova Post Hoc Tamahane's T2 Test

Intergroup Comparisons	Actual Mean Difference (In Mm)	Mean Difference (in Percentage)	P Value	Inference
AFTER 48 HOURS				
Antibiotic Group Vs Dexamethasone Group	0.56	2.79%	P < 0.0001	Highly Significant
Antibiotic Group Vs Prednisolone Group	0.57	4.72%	P < 0.0001	Highly Significant
Dexamethasone Group Vs. Prednisolone Group	0.01	1.93%	P = 0.006	Significant
AFTER 1 WEEK				
Antibiotic Group Vs Dexamethasone Group	0.55	2.72%	P < 0.0001	Highly Significant
Antibiotic Group Vs Prednisolone Group	0.45	3.54%	P < 0.0001	Highly Significant
Dexamethasone Group Vs. Prednisolone Group	-0.10	0.81%	P = 0.176	Not Significant

Table 6: An intergroup statistical evaluation using POST HOC TAMAHANE'S T2 TEST shows significant difference were observed between the vertical dimensions of each group at 2ndpost operative day, with prednisolone group showing the least increase in vertical dimension as seen in table 4. At 7thpost operative day, significant difference were observed between the vertical dimensions measured in patients of antibiotic group and other 2 groups. The statistical difference between dexamethasone and prednisolone group was not significant during this period (p-0.176).Based on the above results, prednisolone group depicted lesser increase in vertical dimension than dexamethasone and antibiotic group.

Table 7 - Inter Group Comparison of Percentage Increase in Horizontal Dimension using Anova Post Hoc Tamahane's T2 Test

Intergroup Comparisons	Actual Mean Difference (In Mm)	Mean Difference (In Percentage)	P Value	Inference
AFTER 48 HOURS				
Antibiotic Group Vs Dexamethasone Group	12.67	12.90%	P < 0.0001	Highly Significant
Antibiotic Group Vs Prednisolone Group	45.00	16.14%	P < 0.0001	Highly Significant
Dexamethasone Group Vs. Prednisolone Group	32.33	3.24%	P = 0.013	Significant
AFTER 1 WEEK				
Antibiotic Group Vs Dexamethasone Group	8.33	8.50%	P < 0.0001	Highly Significant
Antibiotic Group Vs Prednisolone Group	33.00	9.48%	P < 0.0001	Highly Significant
Dexamethasone Group Vs. Prednisolone Group	24.67	0.98%	P = 0.248	Not Significant

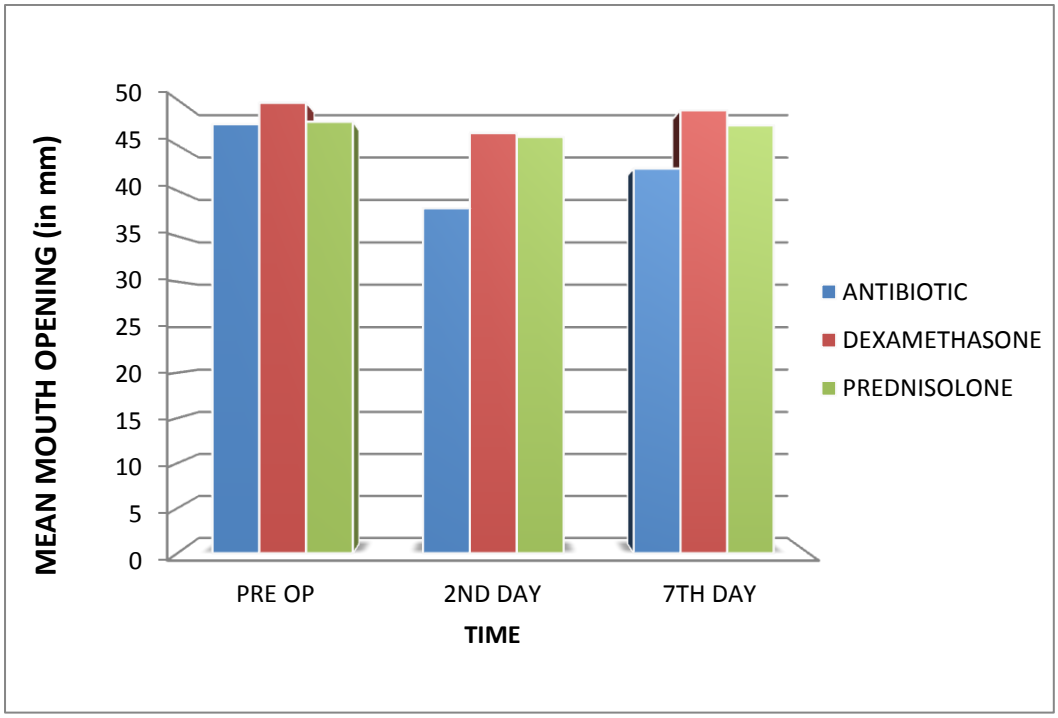
Table 7: An intergroup statistical evaluation using shows significant difference were observed between the vertical dimensions of each group at 2ndpost operative day, with prednisolone group showing the least increase in vertical dimension as seen in table 5. At 7thpost operative day, significant difference were observed between the horizontal dimensions measured in patients of antibiotic group and other 2 groups. The statistical difference between dexamethasone and prednisolone group was not significant during this period (p-0.248). Based on the above results, prednisolone group depicted lesser increase in vertical dimension than dexamethasone and antibiotic group.

Table 8 - Comparison of Pain Scores Recorded at Different Time Interval

Group	Time Interval	Mean Vas Score	Mean Rank (Friedman's Test)	P Value	Inference
Antibiotic Group	Preoperative	3.30	1.63	P < 0.001	Highly Significant
	48 Hours	5.90	2.68		
	1 Week	4.00	1.68		
Dexamethasone Group	Preoperative	3.17	2.03	P < 0.001	Highly Significant
	48 Hours	3.80	2.55		
	1 Week	1.83	1.42		
Prednisolone Group	Preoperative	2.37	2.30	P < 0.001	Highly Significant
	48 Hours	2.30	2.27		
	1 Week	0.70	1.43		

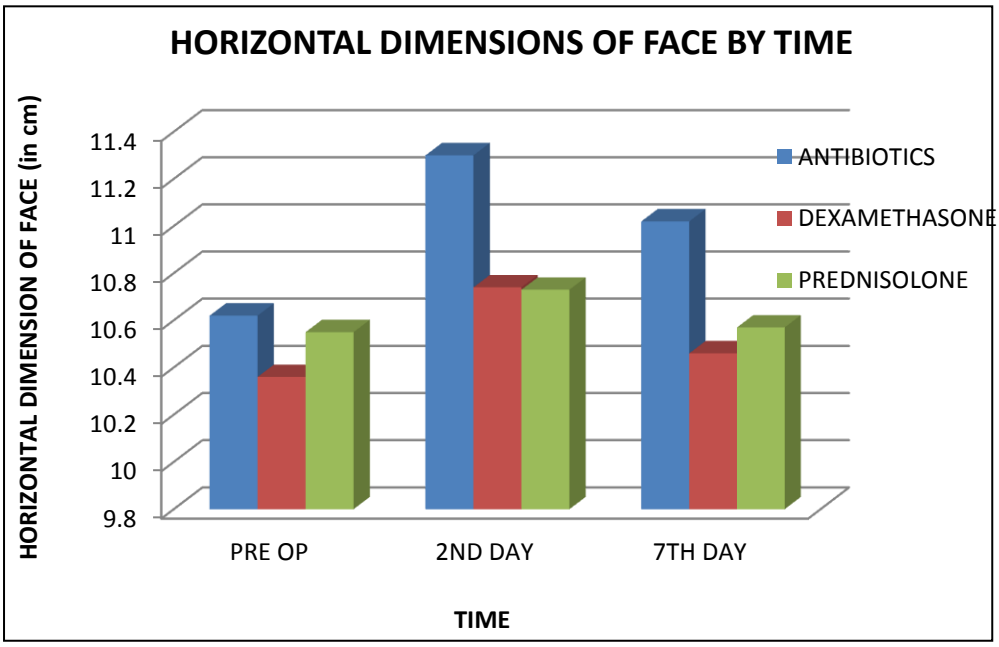
Table 8: Shows the mean visual analog scale observed in the three groups at different time intervals. Statistically significant reduction in pain ($p<0.001$) was observed in all the three groups after 2^{nd} and 7^{th}post operative day. The least post operative visual analog score was observed in prednisolone group after 2^{nd} and 7^{th}post operative day.

GRAPH 2 – MEAN MOUTH OPENING MEASUREMENTS OBSERVED DURING DIFFERENT TIME INTERVALS



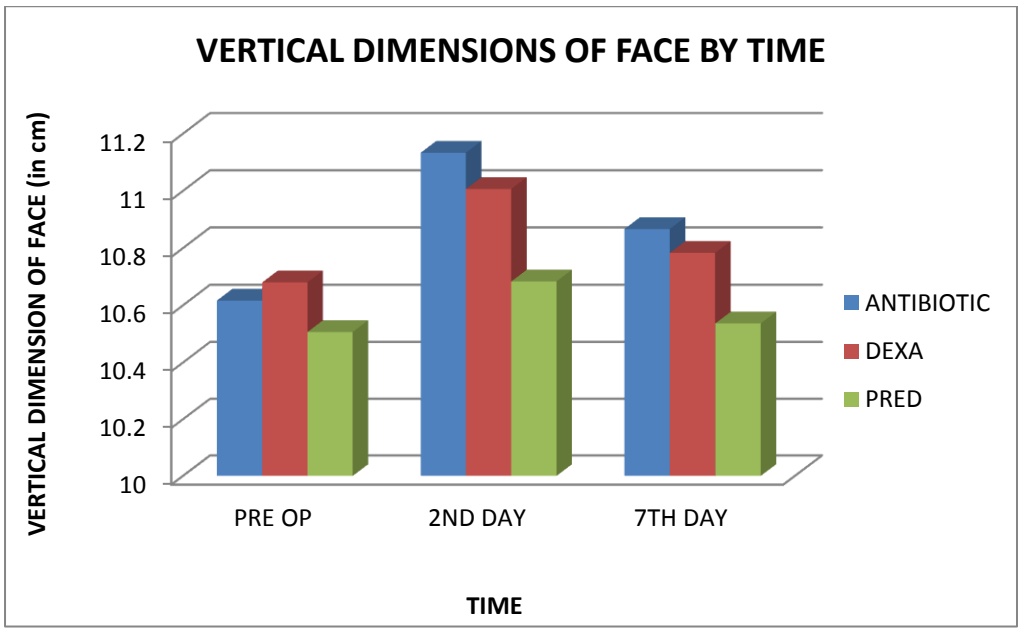
Graph no.2 – shows the mean reduction in mouth opening at different time intervals. The difference between these mean reductions was found to be statistically significant. ($p<0.001$) using analysis of variance (ANNOVA) test. Thus the prednisolone group showed the least reduction in mouth opening followed by dexamethasone & antibiotic group respectively.

GRAPH 3 – MEAN HORIZONTAL DIMENSIONS OBSERVED DURING DIFFERENT TIME INTERVALS



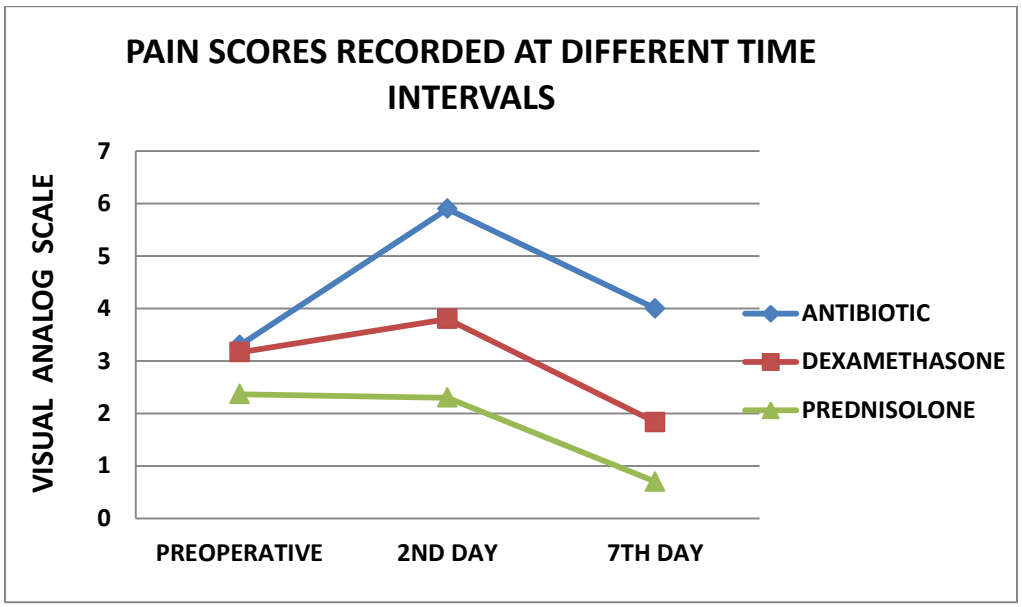
Graph no. 3 - depute the mean horizontal dimensions of the face that were observed in each group at different time intervals. The difference observed between the three groups was highly significant ($p<0.001$) both after 2^{nd} and 7^{th}post operative day. It's clearly suggests that Prednisolone group depicted lesser increase in vertical dimension than dexamethasone and antibiotic group.

GRAPH 4 – MEAN VERTICAL DIMENSIONS OBSERVED DURING DIFFERENT TIME INTERVALS



Graph no. 4 - depute the mean vertical dimensions of the face that were observed in each group at different time intervals. The difference observed between the three groups was highly significant ($p<0.001$) both after 2^{nd} and 7^{th} post operative day. Prednisolone group depicted lesser increase in vertical dimension than dexamethasone and antibiotic group.

GRAPH 5 - COMPARISON OF PAIN SCORES RECORDED AT DIFFERENT TIME INTERVALS



Graph no. 5 - shows the mean visual analog scale observed in the three groups at different time intervals. Statistically significant reduction in pain ($p<0.001$) was observed in all the three groups after 2^{nd} and 7^{th} post operative day. The least post operative visual analogue score was observed in prednisolone group after 2^{nd} and 7^{th}post operative day.

GROUP A – PRE OP ORAL PREDNISOLONE WITH REGULAR POST OP MEDICATION

S. No	Patients Name	A/S	Pain(Vas)			Mouth Opening (Mm)			Swelling (Cm)					
			Pre Op	2nd Day	7th Day	Pre Op	2nd Day	7th Day	Pre Op		2nd Day		7th Day	
									HD	VD	HD	VD	HD	VD
1.	Mr.Chandran	37/M	3	2	0	35	34	35	11.8	10.7	12	11	11.8	10.7
2.	Ms.Karthiga	20/F	2	1	0	30	30	30	9.8	9.7	10	9.8	9.8	9.7
3.	Mrs.Kavitha	25/F	2	1	0	55	54	55	11.2	10.5	11.3	10.8	11.2	10.5
4.	Mrs.Suganthi	28/F	1	1	0	51	50	51	10.7	9.5	11	9.8	10.7	9.5
5.	Mrs.Gayathri	27/F	0	2	0	45	43	45	10	10.2	10.1	10.2	10	10.2
6.	Mr.Shakthivel	21/M	3	1	0	46	46	46	11.5	11.8	11.7	11.9	11.5	11.8
7.	Mrs.Kavitha	32/F	3	3	0	45	43	45	10.5	10.7	10.8	10.7	10.5	10.7
8.	Mrs.Menaka	29/F	3	2	0	48	46	47	10.5	10.7	10.5	10.7	10.5	10.7
9.	Mr.Malarman	26/M	0	3	2	55	54	55	10.5	11.3	10.6	11.5	10.5	11.4
10.	Mr.Raja	22/M	5	2	0	50	49	51	11.4	10.5	11.5	10.7	11.4	10.6
11.	Mrs.Sumathi	24/F	0	0	0	55	55	55	11.8	12	11.8	12	11.8	12
12.	Mr.Febin	22/F	5	6	2	46	42	45	9.1	9.5	9.5	9.8	9.2	9.5
13.	Mr.Ramesh	21/M	8	5	0	41	41	41	10.5	10.5	10.8	10.9	10.5	10.5
14.	Mrs.Shanthi	35/F	3	0	0	36	36	36	9.3	9.8	9.4	9.8	9.3	9.8
15.	Mr.Ranjith	33/M	7	2	0	40	40	42	11.9	10.7	11.5	10.6	11.5	10.4
16.	Mrs.Shanthi	29/F	1	0	0	48	48	48	10.1	11	10.3	11.1	10.1	11
17.	Ms.Gayathri	28/F	3	3	0	31	30	31	9.2	9.5	9.5	9.8	9.3	9.6
18.	Mrs.Suguna	30/F	0	5	2	43	35	41	11.3	10.1	11.8	10.5	11.4	10.2
19.	Ms.Priyadarshini	23/F	0	0	0	51	50	51	10.5	11.2	10.6	11.3	10.5	11.2
20.	Mrs.Deepa	24/F	3	2	0	56	54	56	9.5	11	9.8	11	9.6	11
21.	Mr.Arun	25/M	8	5	3	47	45	45	10.7	9.5	10.8	9.6	10.7	9.6
22.	Mr.Balasubramani	60/M	0	0	0	50	50	50	9.5	11	9.6	11.2	9.6	11.1
23.	Mrs.Maragatham	40/F	0	5	5	55	50	52	9.6	10.1	10	10.3	9.8	10.3
24.	Mrs.Ponmani	28/F	0	5	2	51	45	48	9.5	11.2	9.8	11.3	9.7	11.3
25.	Mr.Paramasivam	45/M	3	3	0	56	53	56	10.6	10.8	11	11.3	10.6	10.9
26.	Mr.John	26/M	0	0	0	39	39	39	9.6	9.1	9.8	9.5	9.6	9.1
27.	Mrs.Kiruthiga	27/F	0	2	0	57	56	57	11.9	10.5	11.9	10.5	11.9	10.5
28.	Mrs.Balkesh	28/F	8	3	3	61	55	58	11.8	10.2	12	10.8	11.9	10.4
29.	Mr.Anilkumar	22/M	0	5	2	51	51	51	11.3	10.8	11.6	11	11.3	10.8
30.	Mr.Senthilkumar	25/M	0	0	0	53	53	53	10.8	11.1	10.9	11.1	10.8	11.1

GROUP B – PRE OP ORAL DEXAMETHASONE WITH REGULAR POST OP MEDICATION

S. No	Patients Name	A/S	Pain(Vas)			Mouth Opening(Mm)			Swelling(Cm)					
			Pre Op	2nd Day	7th Day	Pre Op	2nd Day	7th Day	Pre Op		2nd Day		7th Day	
									HD	VD	HD	VD	HD	VD
1.	Mr.Saravana Kumar	25/M	4	3	0	46	42	46	10	10.1	10.5	10.5	10.2	10.1
2.	Mr.Subramani	42/M	1	2	0	70	64	70	11.5	11.8	11.8	12	11.5	11.8
3.	Mrs.Shanthi	32/F	3	2	0	44	40	44	11.2	10.3	11.5	10.6	11.2	10.4
4.	Mrs.Parveen Banu	35/F	5	5	3	57	53	56	10.6	11.2	11.1	11.4	10.8	11.2
5.	Mr.Gopala Krishnan	29/M	0	3	0	39	35	38	9.6	10.2	9.8	10.5	9.6	10.2
6.	Mr.Mohan Raj	29/M	3	5	3	53	53	53	11.9	11.5	12.1	11.8	11.9	11.6
7.	Mrs.Sharmila	23/F	0	5	3	55	49	54	9.5	10	9.8	10.2	9.5	10.1
8.	Mr.Azarudin	25/M	7	3	0	50	47	50	10	12	10.5	12.3	10.1	12
9.	Mrs.Amutha	36/F	3	5	3	45	43	44	11.5	11	11.7	11.2	11.6	11.1
10.	Mr.Keerthi Varman	22/M	0	3	2	45	43	44	10.5	11.3	10.8	11.6	10.7	11.5
11.	Mr.Dinesh Antony	22/M	3	4	3	46	44	45	9.5	10	9.8	10.2	9.6	10.1
12.	Mr.Rajan	45/M	0	3	0	53	49	52	11.5	11.8	11.6	11.9	11.5	11.9
13.	Mr.Shanmugam	32/M	0	3	0	52	46	48	10.5	11.2	10.8	11.3	10.5	11.2
14.	Mrs.Rekha Latha	32/F	5	5	2	43	40	42	11.3	11.5	11.8	12	11.4	11.7
15.	Mrs.Prathiba	30/F	3	5	3	50	48	50	8.6	9.2	9.3	9.8	9	9.4
16.	Mr.Sethu Raman	35/M	5	3	0	51	48	50	10.6	11.1	10.7	11.3	10.6	11
17.	Mr.Ananthan	40/M	8	5	3	46	40	43	11.3	11.7	12	12.3	11.4	11.8
18.	Mr.Krishnan	20/M	6	6	3	50	45	48	11.2	10.3	11.6	10.6	11.3	10.4
19.	Mrs.Thilagavathy	30/F	6	5	3	46	45	45	10	10.1	10.5	10.6	10.3	10.4
20.	Mrs.Rani	32/F	0	0	0	44	43	44	9.8	10.2	10	10.3	9.8	10.2
21.	Mrs.Bagyalakshmi	29/F	3	5	3	57	50	57	10.8	11.2	11.2	11.8	10.9	11.3
22.	Mrs.Shoba	30/F	8	2	0	51	51	51	10.6	11.2	10.8	11.4	10.6	11.2
23.	Mrs.Nagalakshmi	31/F	3	5	3	48	40	47	10.3	10	10.8	10.8	10.5	10.6
24.	Mrs.Punitha	27/F	5	5	4	59	55	58	11.2	11.6	11.8	12	11.4	11.9
25.	Mrs.Gokila	30/F	0	3	0	37	36	37	9.2	9.5	9.8	10	9.3	9.6
26.	Mrs.Jesintha	23/F	0	3	3	46	46	46	10.3	10.1	10.8	10.1	10.3	10.1
27.	Ms.Dhanya	17/F	6	3	0	43	42	43	9.1	9.8	9.5	10	9.2	9.8
28.	Mr.Prakash	31/M	0	3	3	61	58	61	9.8	10.1	10	10.5	9.8	10.1
29.	Mrs.Vidhya	30/F	8	5	5	42	38	39	9.6	10.1	10	10.5	9.8	10.3
30.	Mrs.Geetha Rani	35/F	0	5	3	61	57	60	9.3	10.3	9.8	10.7	9.6	10.5

GROUP C – POST OP REGULAR MEDICATION ALONE

(CONTROL GROUP)

S. No	Patients Name	A/S	Pain(Vas)			Mouth Opening(Mm)			Swelling(Cm)					
			Pre Op	2nd Day	7th Day	Pre Op	2nd Day	7th Day	Pre Op		2nd Day		7th Day	
									HD	VD	HD	VD	HD	VD
1.	Mr.Mohan	44/M	1	4	3	45	40	42	10.2	8.6	10.8	9.0	10.4	8.6
2.	Mrs.Dhanalakshmi	19/F	1	6	3	45	38	42	9.5	11	10.5	11.8	9.8	11.3
3.	Mr.Kamaraj	40/M	5	8	6	46	23	38	10	10.1	11	10.8	10.8	10.5
4.	Mrs.Meena	33/F	0	5	5	54	43	51	11.2	10.5	11.8	10.9	11.8	10.8
5.	Mr.Senthil Kumar	34/M	7	5	3	56	50	54	10.5	11.2	10.8	11.5	10.6	11.3
6.	Mrs.Deepa Lakshmi	28/F	0	6	3	39	25	31	9.8	9.7	10.6	10.3	10.3	10
7.	Mrs.Kavitha	29/F	6	8	5	50	43	46	9.2	9.1	10	9.8	9.8	9.6
8.	Mrs.Jaya	28/F	6	6	5	45	39	43	9.8	10.5	10.2	10.9	10	10.5
9.	Mrs.Manju	35/F	3	5	5	45	38	42	10.5	11	11.1	11.5	10.8	11.2
10.	Mr.Kathirvel	28/M	0	4	2	52	45	48	12	11.8	13	12.3	12.4	12
11.	Mr.Perumal	38/M	5	7	5	47	40	44	10.2	10.9	10.8	11.5	10.5	11
12.	Mr.Ganeshan	26/M	1	6	3	47	37	40	11.4	10.5	12.2	11.3	12	10.8
13.	Mrs.Malathy	29/F	6	4	4	46	40	42	10.5	11.2	11.5	11.8	11.1	11.3
14.	Mr.Balamani	30/M	0	5	3	51	50	51	11.2	11.4	11.8	11.8	11.5	11.6
15.	Mrs.Saradha	32/M	8	8	8	56	53	54	9.3	9.1	10.5	9.9	10	9.6
16.	Mr.Bharathi Mohan	25/M	5	3	3	43	38	40	9.8	10.2	10	10.5	9.8	10.3
17.	Mr.Yuvaraj	22/M	5	3	3	43	42	43	11.3	11.1	11.5	11.6	11.5	11.5
18.	Mrs.Kalamani	38/F	0	8	7	48	42	43	12	11.8	12.6	12	12.4	11.9
19.	Mrs.Chitra	40/F	4	6	4	40	22	32	9.5	10.2	11	11.5	10.7	11
20.	Mr.Eswaran	28/M	4	5	3	52	30	45	11.8	10.7	12.5	11.2	12.3	11
21.	Mrs.Hema	35/F	3	8	5	52	42	45	10.6	10.8	11.5	11.7	11	11.3
22.	Mr.Vadivel	29/M	3	3	0	40	35	38	9.8	10.3	10.2	10.8	10	10.4
23.	Mr.Shanmugam	20/M	5	8	5	48	40	45	11.3	11	12	11.6	11.8	11.4
24.	Mrs.Kavitha	24/F	0	5	2	50	48	48	12.1	11.8	12.8	12	12.6	12
25.	Mr.Raghupathy	50/M	0	8	5	53	43	50	10.2	11.1	10.8	11.8	10.3	11.4
26.	Mrs.Bushar	28/F	0	9	6	35	20	23	9.8	9.5	10.6	9.8	10.2	9.6
27.	Mr.Sivaprakanthan	32/M	7	3	0	45	40	45	11.6	10.8	11.7	10.8	11.7	10.8
28.	Mrs.Amudha	26/F	5	8	5	57	35	38	11.2	10.8	12	11	11.5	10.9
29.	Mr.Mahendra Kumar	43/M	6	8	6	57	31	38	10.6	11.3	11.3	11.8	11.1	11.8
30.	Mr.Murali	24/M	3	5	3	32	30	32	11.8	10.5	12	10.8	11.8	10.6

Discussion

DISCUSSION

The surgical removal of impacted mandibular third molar is a common oral surgical procedure which involves trauma to soft and bony tissues resulting in pain, swelling, and trismus which are among the cardinal signs of inflammation. Postoperative oedema is a consequence of tissue injury during surgery and the raising of muscular attachments, and appears as a result of direct trauma to blood and lymph vessels. This condition represents fluid accumulation in the interstitial area due to transudation from injured blood vessels and fibrin obstruction of lymph drainage[33, 34]. Trismus or inability to open the mouth to normal limits frequently occurs after surgery. The most common cause of this condition is muscular spasm resulting from inflammation related to operative trauma[33]. Post operative pain may also add up to the spasm and jaw limitation. Pain is less easily explainable. It has been attributed simply to pressure on nerve endings resulting from exudation. Pain following surgical removal of third molar is due to release of various mediators into the local environment, such as arachidonic acid metabolites, 5-HT and bradykinin. These mediators increase the responsiveness of local nociceptors[10].

The factors contributing to post operative pain, edema and trismus is complex but many of the contributing factors are related to the inflammatory process. Meticulous surgical technique will minimise the sequel of inflammation but will not prevent them. Hence the use of

pharmacotherapy will help in controlling the extent of the inflammatory process so that the post operative sequel may be reduced in intensity or severity.

When looking back into the history of oral and maxillofacial surgery, various treatment modalities have been tried to control the post operative sequel of third molar surgery. These include the use of antibiotics[32,43,47],steroids[8,13,17,23,26,37],antihistamines[31,49],serratiopeptidase[2,10,4] NSAIDs[5,10,12,17,21,41] and enzymes[38,48]etc which have their own contraindications and adverse effects.

The aim and objective of this randomized clinical trial is to compare the effectiveness of oral pre-operative administration of prednisolone and dexamethasone in preventing post operative sequel following surgical removal of impacted lower third molar on 90 patients.

The 90 patients selected in this study were randomly divided into Group A, B & C (30 patients each). All the cases were operated by a single person and they were evaluated preoperatively and postoperatively for pain, mouth opening, and facial swelling. The comparison was done on the basis of mean measurements of selected parameters. No clinically apparent side effects of the used drugs were observed.

Synthetic steroids are used in exodontia to inhibit mediators of acute inflammation. For more than 30 years, dentists have evaluated steroids for

reduction of pain, trismus and swelling after extractions. Exactly how steroids influence inflammation is not completely understood and is a continuing area of investigation. The primary mechanisms are thought to involve suppression of leukocyte and macrophage accumulation at the site of inflammation and prevention of prostaglandin formation. Prostaglandins are inhibited by the disruption of the arachidonic acid cascade. Lipocortin, an endogenous protein produced by steroids, blocks the activity of phospholipase thus influencing the release of arachidonic acid from cell membranes and the synthesis of prostaglandins, leukotriens, and thromboxane[15].

Currently there are many glucocorticosteroids to choose from, with differing potencies, biologic half-lives and mineralocorticoid effects. Specifically, the synthetic steroids dexamethasone and prednisolone have been used extensively in oral and maxillofacial surgery for their active anti-inflammatory, low mineralocorticoid effects & the least adverse effects on leukocyte chemotaxis[15]. Also dexamethasone has a longer duration of action than prednisolone[50].

Post-operative sequel following third molar surgery results from inflammation after surgical procedure. The aim of the pharmacotherapy is therefore to minimize inflammation. In most studies, NSAIDs[5,10,12,17,21,41] have been used to prevent post-operative pain and steroids[8,13,17,23,26,37] have been used to control the swelling and trismus. Pre-operative administration of anti-inflammatory medication has resulted in more efficient reduction of

pain than post-operative treatment[8, 28]. Much has been written about the parenteral corticosteroid use in oral surgery, but little has been published on the oral route of administration. Effectiveness of the oral route of administration is dependent on the patient compliance. Orally administered glucocorticosteroids are rapidly and almost completely absorbed however, repeated dosing is required to maintain adequate blood levels[8,39] while the Intramuscular administration allows the use of repository (acetate) drug forms, which provide a slow absorption, prolonged anti-inflammatory effect but may cause a higher risk for adrenal suppression[8,17]. Studies using intravenous dosing suggest that a single preoperative intravenous dose results in immediate but unsustained improvement in pain, swelling and trismus. Hence, intravenous dosing may require postoperative supplemental drug administration (oral or intramuscular) to be optimally effective.[23, 24]

In all of these reviews[8,13,18,23,37] it seemed that the use of glucocorticoids proved beneficial in reducing post-operative sequelae. However, a real problem with glucocorticoids is that the administration of large doses can suppress adrenal corticoid activity and also repeated administration of high doses of glucocorticoids increases the risk of infection and impaired wound healing[15]. In weighing the risks against the benefits, suppression of endogenous Cortisol production must be taken into account.

Studies on the effect of short-term steroid therapy for oral surgery on plasma cortisol levels have shown that after an initial drop in level they returned to normal ranges by seven days post-operatively.[8,16,28,52] On the basis of this evidence adreno-cortical suppression is not a significant problem with short term therapy as used for reduction of swelling in oral surgery. In addition, there is no evidence that delayed healing or increased infection rates occur with this use of steroids.[28] However, there were literatures supporting that short term; high-dose steroids do not significantly impair the HPA.[15, 29, 39, 52]

As with the use of any medication, benefits must outweigh the risks. Potential side effects and risks with the use of steroids include suppression of the immune system, hypertension, hyperglycemia, a sense of euphoria. Other adverse effects associated with corticosteroid use include posterior sub capsular cataracts, myopathy, osteoporosis, alterations in mood or personality, psychosis, thin fragile skin, and impaired wound healing. Absolute contraindications noted are ocular herpes, tuberculosis, primary glaucoma, acute psychosis and allergy[8, 15, 33, 39, 50].

Acute postoperative pain following third molar extraction is predominantly a consequence of inflammation caused by tissue injury. Corticosteroids alone do not seem to have a clinically significant analgesic effect, but it has been reported that their use is related to a reduction in the number of analgesic tablets used after surgical extractions[25]. The present results show a statistically significant decrease in patient's pain perception

was observed in all the 3 groups (Table 8). The least post operative visual analogue score was observed in prednisolone group after 2nd and 7thpost operative day as evident in graph no.5. Our result indicates that steroids have synergistic effect with analgesics in controlling post operative pain.

There was a significant difference ($p<0.001$) among groups (control, prednisolone, and dexamethasone groups) in the interincisal mouth opening on 2nd and 7thpost operative days (Table 2). Intergroup comparison using ANOVA POST HOC TAMAHANE'S T2 TEST (Table 3) shows that there was a highly significant statistical difference in mean percentage between the control group and the other two groups ($p<0.001$) both after 2nd and 7thpost operative day. It shows that steroids have definite role in controlling post operative trismus. This is comparable with the retrospective study conducted by Michael R et al who found that the post operative decrease in inter incisal opening was less in the corticosteroid group as compared with the control group[33,37,38]. Our result suggests that prednisolone and dexamethasone were highly effective in controlling trismus than control group at 2nd and 7thpost operative day while dexamethasone is less effective than prednisolone at 2thpost operative day in controlling post operative trismus (graph no.2).

In all groups, facial swelling was most severe on the second day after surgery and began to return to normal baseline facial contour by the seventh day postoperatively (table 4 & 5). Graph no. 3 & 4 shows the

differences in horizontal and vertical dimension of edema between the 3 groups observed over time. Postoperative edema tended to be less severe in both test groups receiving dexamethasone and prednisolone. On the 2nd and 7th postoperative day, inter group comparison using post hoc analysis showed a statistically significant difference between the dexamethasone and prednisolone group compared with the control group (table 6 & 7). Other studies in the past have also demonstrated that administration of steroids showed reduced incidence of edema post operatively[13,15,23,38]. Result from this investigation showed that post operative edema was less in steroid groups as compared with control group at 2nd and 7th day, and also prednisolone group depicted lesser edema at postoperative day 2 (horizontal and vertical dimension) than dexamethasone and control group.

Over all, Prednisolone seems to be a better choice for treating post operative sequelae following impacted third molar removal. Both the test drugs seem to be well tolerated and safe in such a minimal dosage used in our study and produces neither complications nor any side effects. Future studies are needed to determine the optimal dose, timing and duration of corticosteroid therapy.

Summary & Conclusion

SUMMARY AND CONCLUSION

This study was conducted on 90 patients selected among the outpatients attending the Department of Oral and Maxillofacial Surgery, Sri Ramakrishna Dental College and Hospital, Coimbatore. The patients were selected to compare the effectiveness of oral prednisolone and dexamethasone administered pre operatively, in reducing post surgical sequelae following impacted third molar removal.

Ninety patients were randomly divided into group A, B & C (30 patients each). Group A patients received 10mg prednisolone orally 20minutes before the procedure, group B patients received 8mg dexamethasone orally 20 minutes before the procedure, group C patients received no steroids (control group). Post operatively all the patients in each group received 500mg amoxicillin, 400mg of metronidazole, and 650 mg of paracetamol 6^{th}hourly for three days. Patients were evaluated pre operatively and on 2^{nd} and 7^{th} post operative days for pain, swelling, and mouth opening.

It was observed that oral pre operative administration of steroids have a definite role in controlling post operative trismus, pain and edema in patients undergoing surgical removal of impacted mandibular third molar.

There was a statistically significant reduction in the amount of trismus in patients receiving preoperative steroids. The need for additional

analgesic medication post operatively was less in the prednisolone and dexamethasone group than the control group. Also the postoperative swelling tended to be less severe in both test groups receiving dexamethasone and prednisolone. Both the test drugs seem to be well tolerated and safe in such a minimal dosage used in our study and produces neither complications nor any side effects. Considering the previous studies and the experience of the present one, it could be reasonably inferred that preoperative oral administration of steroids has a better analgesic and anti inflammatory action than the regular antibiotic and analgesic alone. Other studies have also demonstrated that the action is potentiated when steroids were given in combination with antibiotic and analgesics.

The findings in this study also show that the prednisolone group depicted lesser edema and trismus postoperatively than dexamethasone and control group. Therefore pre operative oral prednisolone should be considered for attenuation of post surgical sequelae in healthy patients undergoing surgical removal of impacted mandibular third molar. However, to put in more conclusively, an extensive clinical study has to be conducted to precisely find out the efficacy of the individual steroids.

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